

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Wood et al.

Serial No.: 10/666,742

Filed: September 19, 2003

For: METHODS FOR THINNING
SEMICONDUCTOR SUBSTRATES THAT
EMPLOY SUPPORT STRUCTURES
FORMED ON THE SUBSTRATES
(Amended)

Confirmation No.: 6057

Examiner: A. Ghyka

Group Art Unit: 2812

Attorney Docket No.: 2269-6095US

VIA ELECTRONIC FILING
July 15, 2008

REPLY BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attn: Board of Patent Appeals and Interferences

Sirs:

This brief is being submitted in reply to the Examiner's Answer of May 15, 2008,
pursuant to 37 C.F.R. § 41.41.

(7) ARGUMENT

(C) ANALYSIS

- (i) THE ASSERTED COMBINATION OF REFERENCE TEACHINGS DOES NOT TEACH OR SUGGEST EACH AND EVERY ELEMENT OF ANY OF CLAIMS 70-74, 76-86, OR 88-98

With respect to the subject matter recited in independent claim 70, the Examiner has acknowledged that neither U.S. Patent 5,354,695 to Leedy (hereinafter “Leedy”) nor U.S. Patent 6,562,661 to Grigg (hereinafter “Grigg”) provides any teaching or suggestion of a support structure that is molded onto an active surface of a semiconductor substrate. Examiner’s Answer, page 5. It has been asserted at pages 5 and 6 of the Examiner’s Answer, however, that U.S. Patent 6,524,881 to Tandy (hereinafter “Tandy”) teaches “that it is known in the art to mold support structures... to provide physical support for a wafer during backgrinding process [sic].” In support of this proposition, the Examiner cites FIGs. 1A and 2 and col. 5, lines 35-40 of Tandy.

Contrary to the Examiner’s suggestion, it is respectfully submitted that Tandy does not teach or suggest “**molding** a support structure on an active surface of [a] semiconductor substrate...” (emphasis supplied). The teachings of Tandy are limited to “[a] submount 17, formed of tape, wax, molding compound [sic] etc. ...” Col. 5, lines 35-40. Tandy provides no teaching or suggestion that the submount 17 is molded onto an active surface of a semiconductor substrate. Rather, it appears from the disclosure of Tandy that the submount 17 is part of a platen 56, which provides physical support for a semiconductor substrate, such as a wafer 10, during back grinding. Col. 5, lines 30-34.

Therefore, like Leedy and Grigg, Tandy does not teach or suggest molding a support structure onto an active surface of a semiconductor substrate, as would be required to maintain the 35 U.S.C. § 103(a) rejections of independent claim 70 and its dependent claims 71-74 and 76-81.

It is also respectfully submitted that Leedy, Grigg, and Tandy do not teach or suggest each and every element of independent claim 82 or of any of its dependent claims.

The substrate thinning (*e.g.*, backgrinding) process of independent claim 82 includes forming a support *on the active surface of a semiconductor substrate* and securing a semiconductor substrate to a platen. An active surface of the semiconductor substrate must face the platen, with the support structure abutting either the platen or a feature on the platen. Once the semiconductor substrate is secured to the platen in this manner, material is removed from its back side.

The process of Leedy includes the formation of a frame 18 *while the substrate 10 is thinned*. Col. 7, line 17, to col. 8, line 14; Figs. 1a and 1b. Thus, the frame 18, which is on the back side of the substrate 10 (col. 7, lines 51-52; Figs. 1a and 1b), could not abut a platen or a feature on the platen during thinning of the substrate 10, let alone be formed on an active surface of the substrate before the thinning process. While Leedy teaches that a *separate bonding frame or ring 19* may be *secured* to an active surface of the substrate 10, the teachings of Leedy are limited to securing the bonding frame or ring 19 to the active surface of the substrate 10 *after the substrate 10 has been thinned*. Col. 8, lines 48-52. Thus, Leedy does not teach or suggest removing material from the back side of a substrate while a support structure that has been

formed on the active surface of the substrate abuts a platen or a feature on a platen, as is required of the method of independent claim 82.

Grigg includes no teaching or suggestion that material may be removed from either side of the flexible substrate disclosed therein, let alone that material may be removed as a support structure on one surface of the flexible substrate abuts a platen or a feature on the platen.

The teachings of Tandy that relate to the removal of material from the back side of a semiconductor wafer are limited to placing a front side of the wafer 10 to a submount 17 against a platen 56, which provides physical support for the wafer 10 as a grinding wheel 52 removes material from the back side of the wafer 10. Col. 5, lines 30-34; FIG. 2. Tandy does not teach or suggest that a support structure of any type has actually been formed on the front side of the wafer 10. Therefore, Tandy does not teach or suggest that material may be removed from the wafer 10 while a support structure that has been formed on the front side of the wafer abuts the platen 56 or a feature on the platen 56, as required by independent claim 82.

Therefore, it is evident that none of Leedy, Grigg, or Tandy teaches or suggests the element of independent claim 82 requiring that a support structure that has been formed on an active surface of a substrate abut a platen or a feature on the platen as material is removed from the back side of the substrate.

- (ii) THERE WOULD HAVE BEEN NO “APPARENT REASON” FOR ONE OF ORDINARY SKILL IN THE ART TO COMBINE REFERENCE TEACHINGS IN THE MANNER THAT HAS BEEN ASSERTED

It is respectfully submitted that, without the benefit of hindsight that the above-referenced application has provided to the Examiner, there would have been no apparent reason for one of ordinary skill in the art to combine teachings from Leedy, Grigg, and Tandy in such a way as to render obvious the subject matter recited in any of claims 70-74, 76-86, or 88-98.

It has been asserted that “all of the references pertain to making semiconductors...” Final Office Action, page 7. This assertion overlooks the fact that “making semiconductors” is a broad field that includes a large number of separate and distinct processes that employ different techniques. In combining teachings from Leedy, Grigg, and Tandy, the Examiner has attempted to combine teachings from separate fields within the general field of “making semiconductors”: methods for thinning semiconductor wafers (Leedy and Tandy); and the manufacture of flexible carrier substrates (Grigg).

Nor has the Examiner provided a convincing line of reasoning as to why one of ordinary skill in the art would have had any apparent reason to combine teachings from Leedy, Grigg, and Tandy in the manner that has been asserted.

Moreover, since none of Leedy, Grigg, or Tandy identifies any shortcomings with the wafer thinning processes of Leedy and Tandy, and since the Examiner has not identified any problems with these processes, or with any other support for the assertion that one of ordinary skill in the art would have been motivated to support a wafer before material is removed from the wafer (*e.g.*, in the manner recited in independent claim 82), it is respectfully submitted that without the benefit of hindsight, one of ordinary skill in the art wouldn’t have had any apparent

reason to combine teachings from Leedy, Grigg, and Tandy in the manner that has been asserted by the Examiner.

In view of the foregoing, it is respectfully submitted that the Examiner has not established a *prima facie* case of obviousness against the subject matter recited in independent claim 82, or in any of claims 83-86 or 88-98 depending therefrom, as would be required to maintain the 35 U.S.C. § 103(a) rejections of these claims.

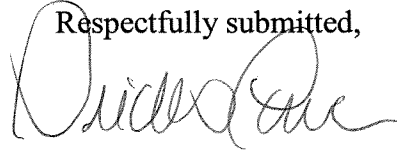
It is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 70-74, 76-86, and 88-98 be withdrawn, and that each of these claims be allowed.

(11) CONCLUSION

It is respectfully submitted that, under 35 U.S.C. § 103(a), each of claims 70-74, 76-86, and 88-98 is drawn to subject matter that is patentable over the subject matter taught in Leedy, in view of teachings from Grigg and Tandy.

Accordingly, reversal of the 35 U.S.C. § 103(a) rejections of claims 70-74, 76-86, and 88-98 is respectfully solicited, as is the allowance of each of these claims.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Brick G. Power", written over the typed name.

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